

(12) UK Patent Application (19) GB (11) 2 333 215 (13) A

(43) Date of A Publication 14.07.1999

(21) Application No 9900297.4

(22) Date of Filing 07.01.1999

(30) Priority Data

(31) 09006611

(32) 13.01.1998

(33) US

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(51) INT CL⁶

G06F 3/037

(52) UK CL (Edition Q)

H4T TBLA

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(58) Field of Search

UK CL (Edition Q) H4K KFH , H4L LECX , H4T TBLA
TBLC TBLM TBLX

INT CL⁶ G06F 3/033 3/037 , H04M 1/00

Online: WPI

(54) Abstract Title

Systems and methods for enabling manipulation of a plurality of graphic images on a display screen

(57) An instrument 36 includes a display screen 14 which includes a bitmap graphical user interface 18 including an on-screen menu 22, and a control element 28 which enables movement of the on-screen menu 22 corresponding to movement of the control element 28, enabling the user to manipulate and select graphic images 12 for executing selected instrument functions. The instrument 36 is operable to enable the user to focus on and select a selectable graphic image 12 from a plurality of graphic images in the on-screen menu 22.

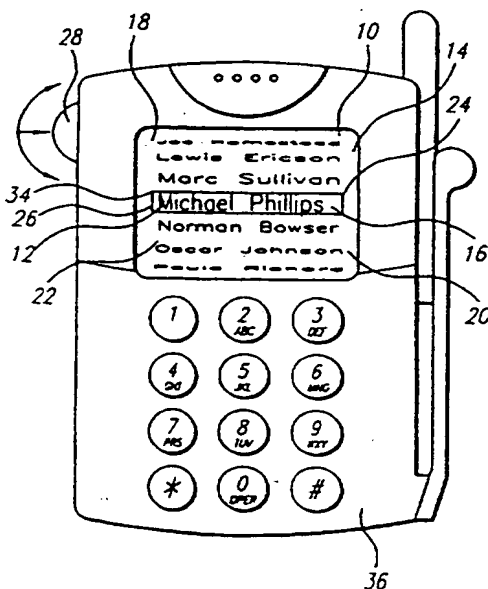


FIG. 2

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

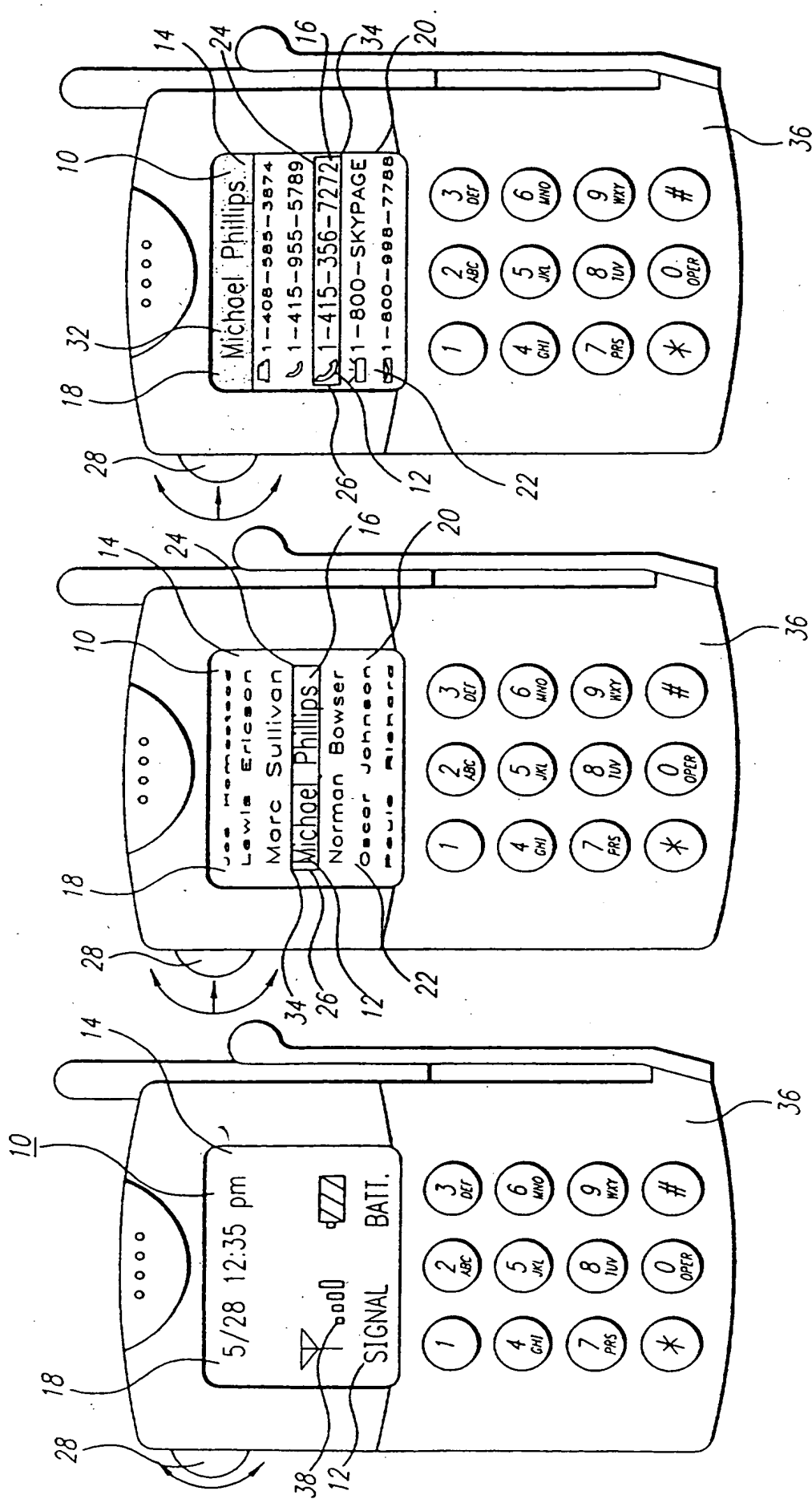


FIG. 1

FIG. 2

FIG. 3

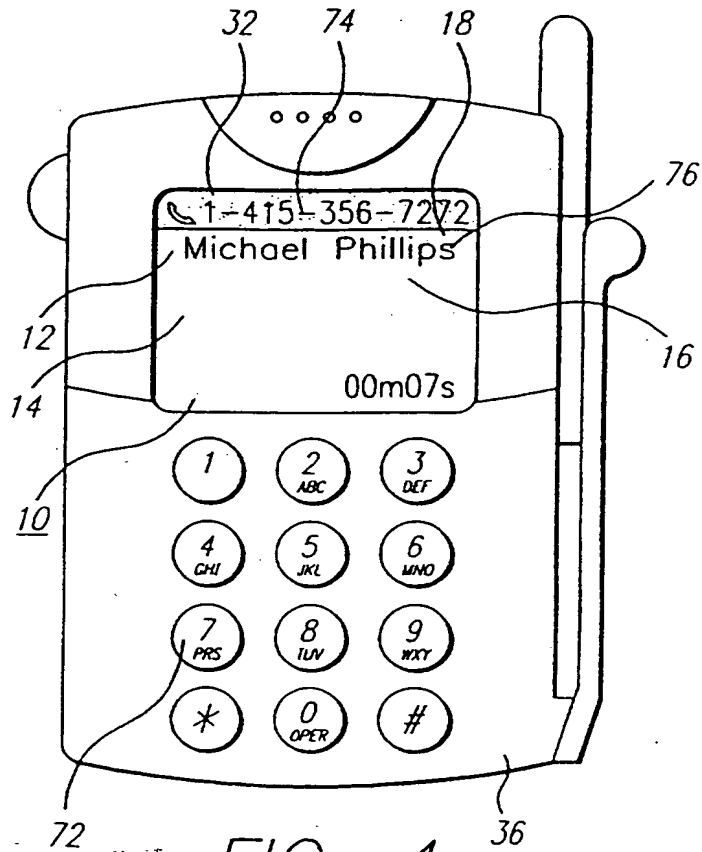


FIG. 4

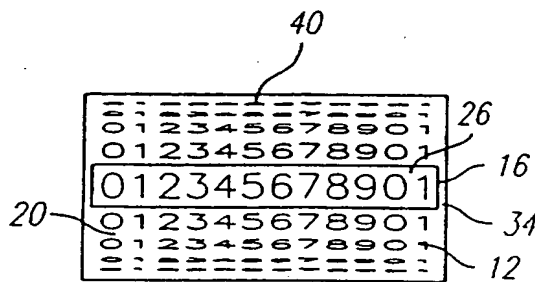


FIG. 5

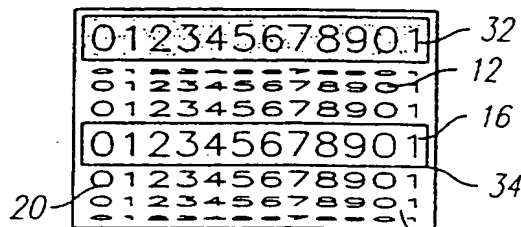


FIG. 6

SYSTEMS AND METHODS FOR ENABLING MANIPULATION
OF A PLURALITY OF GRAPHIC IMAGES
ON A DISPLAY SCREEN

5 The present invention relates generally to systems and methods for enabling manipulation of a plurality of graphic images on a display screen and, more particularly but not exclusively, to a graphical user interface which, with a control device, enables manipulation of such graphic images on the display screen.

10 In an instrument which includes a display screen, an on-screen menu, and a control device, a user may interact with the on-screen menu by viewing the on-screen menu, deciding to select a menu item, and manipulating the control device to generate menu movement and to enable entry of the menu selection.

15 The instrument may comprise a hand-held wireless telephone which includes an on-screen menu displayed in a text text-based interface on a small liquid-crystal display screen, and a jog dial control device for scrolling through the menu and for entry of a menu selection and execution of an instrument function thereby.

20 The small liquid crystal display screen may enable viewing of a small number of lines of text, typically two lines. The menu may include a phone book feature in which names and phone numbers may be entered, for enabling browsing and selection of an entry whereupon the phone number selected is dialed. The instrument may also include other functions, such as pager reception, two-way pager sending, or short message sending such as e-mail. However, such an instrument may require frequent selection of menu entries and instrument functions by the user through the small text-based display screen which displays a very limited number of entries. The user may choose a single
25 item from the items displayed, and may only need to focus on the single item to be selected, but the multiple items on display increase the difficulty in selecting the single item.

Therefore, there has been a need existing for a system which enables the user of an instrument to view and manipulate an intuitive interface in the display, and to view movement in the interface which corresponds to movement of the control device.

- 5 One aspect of the invention provides a system for enabling manipulation of graphic images on a display screen, to enable a user to focus on and select a selectable graphic image from a plurality of graphic images in the display screen, wherein the plurality of graphic images are each movable into and out of a position as the selectable graphic image, the system comprising:

 a display screen;

 means for presenting a plurality of graphic images in the display screen, wherein each graphic image is different from the other graphic images and the plurality of graphic images are each movable into and out of a position as the selectable graphic image, comprising a graphical user interface;

 means for enabling a graphic image to be a selectable graphic image, which graphic image is movable into the selectable position in the presenting means;

 means for enabling the user to differentiate between the graphic image positioned as the selectable graphic image and the graphic images other than the selectable graphic image in the display screen other than by the differences between the graphic images; and

 means for enabling movement of the plurality of graphic images into and out of the position as the selectable graphic image, and for enabling selection of the selectable graphic image in the display.

Another aspect of the invention provides a similar method of enabling manipulation of a plurality of graphic images on a display screen.

A preferred embodiment of the present invention provides an on-screen menu in an interactive graphical user interface, which provides for enabling manipulation
5 of graphic images in a display screen.

The preferred system enables the user to view and manipulate graphic images in the on-screen menu in an intuitive graphical user interface in the display screen.

The preferred system also enables the user to view and manipulate graphic images, and focus on and select a selectable graphic image in the on-screen menu,
10 while being able to view an array of graphic images in the graphical user interface in the display screen.

The invention will now be described by way of example with reference to the accompanying drawings, throughout which like parts are referred to by like references, and in which:

15 FIG. 1 is an elevational view illustrating an initial display in an instrument which includes an on-screen menu for viewing, focusing on, manipulating, and selecting a selectable graphic image in accordance with an embodiment of the present invention;

FIG. 2 is an elevational view of another display in an instrument which
20 includes an on-screen menu;

FIG. 3 is an elevational view of a further display in an instrument which includes an on-screen menu;

FIG. 4 is an elevational view of a still further display in an instrument which includes an on-screen menu;

25 FIG. 5 is an elevational view of an on-screen menu in a display screen; and
FIG. 6 is an elevational view of another on-screen menu in a display screen.

Referring now to the drawings, there are shown preferred embodiments of a system 10 for enabling manipulation of a plurality of graphic images 12 on a display screen 14.

In a preferred embodiment as shown in FIGS. 1-6, system 10 is adapted to enable a user to focus on and select a selectable graphic image 16 from the plurality of graphic images 12 on display screen 14. In system 10, the plurality of graphic images 12 are each movable into and out of a position as a selectable graphic image 16. Each graphic image 12 is different from the other graphic images 12. Graphic images 12 may comprise alphabetical images, numerical images, and icons. A graphical user interface 18 which comprises a bitmap display includes the plurality of graphic images 12 therein, and presents an array 20 of the plurality of graphic images 12 in display screen 14. Graphical user interface 18 may comprise a menu 22 which includes the plurality of graphic images 12 and selectable graphic image 16 therein. Array 20 of graphic images 12 presented in display screen 14 may comprise at least five graphic images, and preferably comprise seven graphic images 12. Menu 22 is scrollable, appears to occupy three-dimensional space, and appears to be a rotatable wheel including a rounded wheel-like surface in a wheel metaphor. A cursor 24 enables a graphic image 12 to be positionable in a position 26 in graphical user interface 18 so as to be a selectable graphic image 16. A jog dial 28 is rotatable and pressable, to enable movement of the plurality of graphic images 12 into and out of position as selectable graphic image 16, and to enable selection of selectable graphic image 16 in display screen 14. Rotation of jog dial 28 results in corresponding rotation of graphic images 12 in display screen 14.

System 10 enables a user to differentiate between the plurality of graphic images 12 and selectable graphic image 16, and to focus on and select one of the plurality of graphic images 12 as selectable graphic image 16. For example, one of the plurality of graphic images 12 may appear as an enlarged image relative to the other graphic images 12, upon moving such graphic image 12 into position as selectable graphic image

16. The enlarged image enables the user to differentiate between selectable graphic image 16 and the other graphic images 12, other than by the differences between graphic images 12, and enables the user to focus on selectable graphic image 16. In the preferred embodiment, the font size of the graphic image 12 which has been moved into position as selectable graphic image 16 is greater than the other graphic images 12. The differentiating font size may comprise the height of the font, in that the height of the font of the graphic image 12 which has been moved into position as selectable graphic image 16 may be greater than the height of the fonts of graphic images 12 other than selectable graphic image 16. Alternatively, for example, menu 22 may include a color background for each graphic image 12 and selectable graphic image 16, with the color background for selectable graphic image 16 being different from the color background for the other graphic images 12, to enable the user to differentiate therebetween.

System 10 also enables the user to view array 20 of the plurality of graphic images 12 in display screen 14, so that the user may be aware of, focus on, and select one of array 20 of graphic images 12 as selectable graphic image 16, by rotation of menu 22 to move the selected graphic image 12 into position 26 as selectable graphic image 16. In the preferred embodiment, the font sizes of graphic images 12 other than selectable graphic image 16 decrease with increasing distance from selectable graphic image 16, enabling the user to view array 20 of graphic images 12 in display screen 14. The font size may comprise the height of the fonts of graphic images 12 other than selectable graphic image 16, which font size may decrease with increasing distance from selectable graphic image 16.

Display screen 14 preferably comprises a bitmap screen for presenting graphical user interface 18. It may comprise a liquid crystal display screen, and may comprise a color display screen. Selectable graphic image 16 is preferably positionable in substantially the center of display screen 14. Movement of one of the plurality of graphic images 12 out of position as selectable graphic image 16 moves such graphic image 12 to the next position which is adjacent to position 26 for selectable graphic

image 16. Menu 22 includes a plurality of spaces 30, each of which includes a graphic image 12 therein. Menu 22 may present a different plurality of graphic images 12 and selectable graphic image 16 in each screen as shown in FIGS. 2-4. In the screen shown in FIG. 4, a header graphic image 32 is also presented.

5 Cursor 24 may preferably include an outline 34 which extends about selectable graphic image 16, or may be adapted to highlight selectable graphic image 16, as by flashing selectable graphic image 16. Position 26 of selectable graphic image 16 may preferably be in substantially the center of display screen 14.

 Jog dial 28 may be rotatable such that rotation thereof results in
10 corresponding rotation of the plurality of graphic images 12 in display screen 14, and may also be pressable to select the selectable graphic image 18. Jog dial 28 may preferably be located on the side of an instrument which may comprise a wireless telephone 36 in which a compact display screen 14 may be mounted, enabling manipulation of jog dial 28 with the thumb of the user, or may be located in the back
15 of wireless telephone 36 enabling manipulation of jog dial 28 with the forefinger of the user.

 Wireless telephone 36 is adapted to perform a plurality of functions which may include dialing a telephone number, paging, and sending a message. It includes graphic level indicators 38 for indicating for example the level of signal strength and
20 battery charge, and may further include graphic images (not shown) for enabling direct access to several instrument functions. Also, the plurality of graphic images 12 and selectable graphic image 16 in a menu 22 each enable access to a function, either directly, or indirectly by enabling access to another menu 22 which enables access to the function. Wireless telephone 36 is adapted to be held by the user in one hand, and to
25 enable manipulation of jog dial 26 with one finger.

 In operation, for example, wireless telephone 36 may be held in one hand by the user, jog dial 28 may be manipulated by one finger of the user, and wireless telephone 36 may be activated by turning on a power switch (not shown). The power

switch may activate display screen 14 which may comprise a bitmap screen including graphical user interface 18 in a liquid crystal display screen 14, to present for example the screen shown in FIG. 1, which may display the date and time of day and graphic level indicators 36 for indicating instrument levels.

- 5 Accessing the next screen as shown in FIG. 2 may present menu 22 in display screen 14, including graphic images 12 and selectable graphic image 16 in menu 22. Selectable graphic image 16 may be presented as the largest of the plurality of graphic images 12 in display screen 14, in that the height of the font of selectable graphic image 16 may be greater than the height of the fonts of graphic images 12 other than
10 selectable graphic image 16, to enable the user to differentiate between selectable graphic image 16 and the other graphic images 12 so as to focus on selectable graphic image 16, as shown in FIGS. 2-6. Also, the height of the fonts of graphic images 12 may decrease with increasing distance from selectable graphic image 16, to enable the user to be aware of and focus on one of array 20 of graphic images 12 as selectable graphic image 16.
15 Selection of selectable graphic image 16 is enabled by cursor 24 which may be positioned at position 26 in substantially the center of display screen 14 in menu 22, in which selectable graphic image 16 may be positioned.

- Rotating jog dial 28 results in corresponding rotation of menu 22, which is scrollable and appears to be a three-dimensional rotatable wheel including a rounded
20 wheel-like surface, so as to move a graphic image 12 which is in position 26 as selectable graphic image 16 out of position 26, and moves the next adjacent graphic image 12 into position as selectable graphic image 16. Pressing jog dial 28 generates selection of selectable graphic image 16, enabling access to the function represented by selectable graphic image 16. For example, pressing jog dial 28 while in the screen shown in FIG.
25 2 wherein the "phonebook" is the selectable graphic image 16 enables access to the "phonebook" screen shown in FIG. 3. Next, pressing jog dial 28 while in the screen shown in FIG. 3 wherein "Michael Phillips" is the selectable graphic image 16 enables access to the screen shown in FIG. 4 which includes the "Michael Phillips" header

graphic image 32. Then pressing jog dial 28 enables access to the dialer function of wireless telephone 36 to dial the telephone number which is selectable graphic image 16 in menu 22.

From the foregoing it will be appreciated that the system embodying the present invention provides advantages in enabling manipulation of a plurality of graphic images on a display screen. While particular forms of the invention have been illustrated and described, it will be apparent that various modifications can be made without departing from the scope of the invention. Accordingly, the invention is not to be limited, except as by the following claims.

CLAIMS

1. A system for enabling manipulation of a plurality of graphic images on a display screen, to enable a user to focus on and select a selectable graphic image from a plurality of graphic images in the display screen, wherein the plurality of graphic images are each movable into and out of a position as the selectable graphic image, the system
5 comprising:
 - a display screen;
 - means for presenting a plurality of graphic images in the display screen, wherein each graphic image is different from the other graphic images and the plurality of graphic images are each movable into and out of a position as the selectable graphic
10 image, comprising a graphical user interface;
 - means for enabling a graphic image to be a selectable graphic image, which graphic image is movable into the selectable position in the presenting means;
 - means for enabling the user to differentiate between the graphic image positioned as the selectable graphic image and the graphic images other than the selectable graphic
15 image in the display screen other than by the differences between the graphic images; and
 - means for enabling movement of the plurality of graphic images into and out of the position as the selectable graphic image, and for enabling selection of the selectable graphic image in the display.
2. The system of claim 1, wherein the differentiating means comprise means for enabling the user to focus on the selectable graphic image.
3. The system of claim 1, wherein the differentiating means comprise the selectable graphic image adapted to appear as an enlarged image relative to the other images in the plurality of graphic images.

4. The system of claim 1, wherein the differentiating means comprise the size of the graphic image fonts, such that the selectable graphic image is comprised of a font size which is larger than the other graphic images in the plurality of graphic images.

5. The system of claim 1, wherein the differentiating means comprise the size of the graphic image fonts, such that the graphic images other than the selectable graphic image are comprised of font sizes which decrease with increasing distance from the selectable graphic image.

6. The system of claim 1, wherein the display screen comprises a bitmap screen.

7. The system of claim 1, wherein the graphical user interface comprises a menu which includes the plurality of graphic images and selectable graphic image therein.

8. The system of claim 1, wherein the graphic image selectability enabling means comprise a cursor in which a graphic image is positionable for enabling the graphic image to be selectable.

9. The system of claim 1, wherein the movement enabling means are rotatable such that rotation thereof results in corresponding rotation of the graphic images in the display screen.

10. The system of claim 1, wherein the movement enabling means comprise a jog dial which is rotatable and pressable.

11. The system of claim 1, wherein movement of the movement enabling means, to move a graphic image out of position as the selectable graphic image moves the graphic image to the next position adjacent the selectable graphic image position.
12. The system of claim 1, further comprising an instrument in which the display screen is mounted, which instrument is adapted to perform a plurality of functions, wherein at least one of the graphic images represents a function of the instrument accessible by selection thereof, such that selection of the graphic image which enables access to the function as the selectable graphic image enables access to the instrument function represented thereby.
13. The system of claim 1, further comprising an instrument in which the display screen is mounted, wherein the instrument is adapted to be held by the user in one hand, and the movement enabling means are adapted to be manipulated by the user with one finger.
14. The system of claim 1, wherein the display screen comprises a liquid crystal display screen.
15. The system of claim 1, wherein the display screen comprises a color display screen.
16. The system of claim 1, wherein the selectable graphic image is positionable in substantially the center of the display screen.
17. The system of claim 1, further comprising a header position in the presenting means wherein a graphic image positioned therein comprises a header graphic image.

18. The system of claim 1, wherein the plurality of graphic images include alphabetical graphic images.

19. The system of claim 1, wherein the plurality of graphic images include numerical graphic images.

20. The system of claim 1, wherein the plurality of graphic images include icons.

21. The system of claim 3, wherein the image which appears to be enlarged appears to be a magnified image.

22. The system of claim 4, wherein the differentiating means further comprise the size of the graphic image fonts, such that the graphic images other than the selectable graphic image are comprised of font sizes which decrease with increasing distance from the selectable graphic image.

23. The system of claim 4, wherein the font size comprises the height of the font, and the differentiating means comprise the height of the font of the selectable graphic image being greater than the font size of graphic images other than the selectable graphic image.

24. The system of claim 5, wherein the font size comprises the height of the font, and the differentiating means comprise the height of the fonts of the graphic images other than the selectable graphic image which decrease with increasing distance from the selectable graphic image.

25. The system of claim 7, wherein the menu appears to occupy three-dimensional space.

26. The system of claim 7, wherein the menu is scrollable.

27. The system of claim 7, wherein the menu includes a plurality of spaces, each of which includes a graphic image therein.

28. The system of claim 8, wherein the cursor comprises an outline of the selectable graphic image.

29. The system of claim 8, wherein the cursor includes means for highlighting the selectable graphic image.

30. The system of claim 9, wherein the movement enabling means are pressable such that pressing thereof results in selection of the selectable graphic image.

31. The system of claim 10, further comprising an instrument in which the display screen is mounted, wherein the jog dial is located on a side of the instrument.

32. The system of claim 10, further comprising an instrument in which the display screen is mounted, wherein the jog dial is located in the back of the instrument.

33. The system of claim 12, wherein the instrument comprises a wireless telephone.

34. The system of claim 15, wherein the graphical user interface comprises a menu which includes the plurality of graphic images and the selectable graphic image,

and the menu includes a color background for the selectable graphic image and for the other graphic images, and the differentiating means comprise the color background for the selectable graphic image being different from the color backgrounds of the other graphic images.

35. The system of claim 22, wherein the font size comprises the height of the font, and the differentiating means comprise the height of the fonts of the graphic images other than the selectable graphic image which decrease with increasing distance from the selectable graphic image.

36. The system of claim 25, wherein the menu appears to be a wheel which is rotatable.

37. The system of claim 25, wherein the menu three-dimensional space appears to include a rounded surface.

38. The system of claim 29, wherein the highlighting means comprise means for flashing the selectable graphic image.

39. The system of claim 30, wherein the movement enabling means comprise a jog dial which is rotatable and pressable.

40. The system of claim 33, wherein the instrument function comprises dialing a telephone number.

41. The system of claim 33, wherein the instrument function comprises paging.

42. The system of claim 36, wherein the instrument function comprises sending a message.

43. The system of claim 39, further comprising an instrument in which the display screen is mounted, wherein the instrument is adapted to be held by the user in one hand, and the jog dial is adapted to be manipulated by the user with one finger.

44. The system of claim 43, further comprising an instrument in which the display screen is mounted, wherein the jog dial is located on a side of the instrument.

45. The system of claim 43, further comprising an instrument in which the display screen is mounted, wherein the jog dial is located in the back of the instrument.

46. The system of claim 44, wherein the jog dial is adapted to be manipulated by the thumb of the user.

47. The system of claim 45, wherein the jog dial is adapted to be manipulated by the forefinger of the user.

48. A method of enabling manipulation of a plurality of graphic images on a display screen, to enable a user to focus on and select a selectable graphic image from a plurality of graphic images in the display screen, wherein the plurality of graphic images are each movable into and out of a position as the selectable graphic image, the method comprising:

5

activating a display screen in a system which includes the display screen, means for presenting a plurality of graphic images in the display screen, wherein each graphic image is different from the other graphic images and the plurality of graphic images are each movable into and out of a position as the selectable graphic image, comprising a

graphical user interface, means for enabling a graphic image to be a selectable graphic image, which graphic image is movable into the selectable position in the presenting means, means for enabling the user to differentiate between the graphic image positioned as the selectable graphic image and the graphic images other than the selectable graphic image in the display screen other than by the differences between the graphic images, and means for enabling movement of the plurality of graphic images into and out of the position as the selectable graphic image, and for enabling selection of the selectable graphic image in the display;

presenting the plurality of graphic images in the display;

moving the movement enabling means to move a graphic image into and out of position as the selectable graphic image wherein movement of a graphic image into position as the selectable graphic image enables the user to select the selectable graphic image; and

activating the movement enabling means to select the selectable graphic image in the display.

49. The method of claim 48, wherein the differentiating means comprise means for enabling the user to focus on the selectable graphic image and the step of activating the movement enabling means comprises selecting the selectable graphic image which the selectable graphic image enabling means enable the user to focus on.

50. The method of claim 48, wherein the differentiating means comprise the selectable graphic image adapted to appear as an enlarged image relative to the other images in the plurality of graphic images, and the step of presenting the plurality of graphic images comprises presenting the selectable graphic image so as to appear as an enlarged image relative to the other images in the plurality of graphic images.

51. The method of claim 48, wherein the differentiating means comprise the size of the graphic image fonts, such that the selectable graphic image is comprised of a font size which is greater than the other images in the plurality of graphic images, and the step of activating the movement enabling means comprises selecting the selectable
5 graphic image font size.

52. The method of claim 48, wherein the differentiating means comprise the size of the graphic image fonts, such that the graphic images other than the selectable graphic image are comprised of font sizes which decrease with increasing distance from the selectable graphic image, and the step of presenting the plurality of graphic images
5 comprises presenting the graphic images other than the selectable graphic image in font sizes which decrease with increasing distance from the selectable graphic image.

53. The method of claim 48, wherein the display screen comprises a bitmap screen, and the step of activating the display screen comprises activating the bitmap screen.

54. The method of claim 48, wherein the graphical user interface comprises a menu which includes the plurality of graphic images and selectable graphic image therein, and the step of presenting the plurality of graphic images comprises presenting the menu.

55. The method of claim 48, wherein the graphic image selectability enabling means comprise a cursor in which a graphic image is positionable for enabling the graphic image to be selectable, and the step of activating the display screen comprises activating the cursor.

56. The method of claim 48, wherein the movement enabling means are rotatable and pressable such that rotation thereof results in corresponding rotation of the menu in the display screen, and pressing thereof results in selection of the selectable graphic image, and the steps of moving and activating the movement enabling means
5 comprise rotating the menu and selecting the selectable graphic image.

57. The method of claim 48, wherein the movement enabling means comprise a jog dial which is rotatable and pressable, and the steps of moving and activating the movement enabling means comprises activating the jog dial.

58. The method of claim 48, wherein movement of the movement enabling means, to move a graphic image out of position as the selectable graphic image, moves the graphic image to the next position adjacent the selectable graphic image position, and the step of moving the movement enabling means comprises moving a graphic image
5 into the next position adjacent the selectable graphic image.

59. The method of claim 48, wherein the system further comprises an instrument in which the display screen is mounted, which instrument includes a plurality of functions performable thereby, wherein at least one of the graphic images represents a function of the instrument accessible by selection thereof, such that
5 selection of the graphic image which enables access to the function as the selectable graphic image enables access to the instrument function represented thereby and the step of activating the movement enabling means comprises accessing the instrument function represented by the selectable graphic image.

60. The method of claim 48, wherein the system further comprises an instrument in which the display screen is mounted, wherein the instrument is adapted to be held by the user in one hand, and the movement enabling means are adapted to be

manipulated by the user with one finger, and the steps of moving and activating the movement enabling means comprise manipulating the movement enabling means with one finger of the user.

61. The method of claim 48, wherein the display screen comprises a liquid crystal display screen, and the step of activating the display screen comprises activating the liquid crystal display screen.

62. The method of claim 48, wherein the display screen comprises a color display screen, and the step of activating the display screen comprises activating a color display screen.

63. The method of claim 48, wherein the selectable graphic image is positionable in substantially the center of the display screen, and the step of presenting the plurality of graphic images comprises presenting the selectable graphic image in substantially the center of the display.

64. The method of claim 48, further comprising a header position in the presenting means wherein a graphic image positioned therein comprises a header graphic image, and the step of presenting the plurality of graphic images comprises presenting the header graphic image.

65. The method of claim 48, wherein the plurality of graphic images include alphabetical graphic images, and the step of presenting the plurality of graphic images comprises presenting the plurality of alphabetical graphic images.

66. The method of claim 48, wherein the plurality of graphic images include numerical graphic images, and the step of presenting the plurality of graphic images comprises presenting the plurality of numerical graphic images.

5 67. The method of claim 48, wherein the plurality of graphic images include icons, and the step of presenting the plurality of graphic images comprises presenting the plurality of icons.

68. A system for enabling manipulation of a plurality of graphic images
10 on a display screen, the system being substantially as herein described with reference to and as illustrated in the accompanying drawings.

69. A method of enabling manipulation of a plurality of graphic images
on a display screen, the method being substantially as herein described with reference
15 to and as illustrated in the accompanying drawings.